



Defense Supply Center Philadelphia
West Coast Support Office
Alameda, California

Pest Facts

Psocids

COMMON NAME: Booklice, psocids

SCIENTIFIC NAME: Various

CLASS/ORDER/FAMILY: Insecta/Psocoptera/Various

METAMORPHOSIS: Simple

INTRODUCTION

Psocids are often called booklice or barklice because of their superficial resemblance to some lice species, and because they are often found on moldy books and papers in damp situations indoors, and under loose, damp bark outdoors. They are primarily nuisance pests in homes but are of considerable importance in insect collections, stored products, and food processing facilities. Their dead bodies in house dust are thought to contribute to asthma attacks. Psocids are found worldwide and throughout the United States, with about 287 species known from the United States.

RECOGNITION

Adults **about 1/32-1/4"** (1-6 mm) long; soft bodied, look like tiny termite workers. **Head somewhat bulging**, eyes varying from large and globose to a single ommatidium/facet, ocelli present or absent. **Antennae long, threadlike**, 11-50-segmented. Prothorax reduced, necklike. **Wings if present, 4 in number**, membranous (like cellophane), front wing larger than hind wing and often with pigmented spot/cell (pterostigma) along front edge before apex of vein R1, number of veins reduced and few crossveins; wings held rooflike over body at rest; wings showing various states of reduction to being absent. **Tarsi 2- or 3-segmented**. Cerci absent. **Mouthparts chewing**.

Nymphs similar to adults in appearance but lack wings, although wing pads may be present.

SIMILAR GROUPS

- (1) Chewing lice (order Mallophaga) with tarsi 1- or 2-segmented, antennae short, 3- to 5-segmented, and ectoparasites of birds and mammals
- (2) Sucking lice (order Anoplura) with tarsi 1 -segmented, antennae short 3- to 5-segmented, and ectoparasites of mammals.
- (3) Termite nymphs and workers (order Isoptera) with antennae short, usually beadlike, tarsi 4-segmented, and cerci present.

REPRESENTATIVE SPECIES.

1. **Cosmopolitan grain psocid:** *Lachesilla pedicularia* (Linnaeus); Lachesillidae.

Adults with head and thorax medium brown, abdomen pale brown with reddish brown ring incomplete ventrally; front wing clear except CU1a, M1, and M2 narrowly brown bordered, with pterostigma narrower at base, M 3-branched; antenna 13-segmented; length from head to closed wing tips about 1/16-1/8" (2-4 mm); tarsi 2- or 3-segmented; found primarily outdoors, common in houses, occasionally in stored grain; distributed worldwide, occurs throughout the United States.

2. **Banded psocid:** *Liposcelis bostrychophila* Badonnel; Liposcelidae.

Adults (known only from females) pale to medium brown with yellowish tinge, head and thorax darker than abdomen; wingless; antenna 15-segmented (rarely fewer), with at least some segments annulated (ringed); compound eye with 7 ommatidia (facets); hind femur with a lateral protuberance, tarsi usually 3-segmented; found outdoors, litter of chick coups, common in old books in damp places and in stored grain; distributed worldwide, occurs throughout but scattered in the United States east of Rocky Mountains, and in western Canada.

3. **Cereal psocid:** *Liposcelus decolor* (Pearman) (=Liposcelus divinatorius (Muller), =*Liposcelus terricolis* (Badonnel)); Liposcelidae.

Adults grayish white to medium brown with scattered darker spots on top of head and sides of thorax; female wingless; antenna 15segmented (rarely fewer), with

at least some segments annulated (ringed); female compound eye with 7 ommatidia (facets); hind femur with a lateral protuberance, tarsi usually 3-segmented; found outdoors, in houses and warehouses, in stored grain and agricultural products; probably distributed worldwide, occurs throughout the United States except for the southeastern states.

4. **Grain psocid:** *Liposcelis entomophila* (Enderlein) (formerly *Liposcelis entomophilus*); Liposcelididae.

Adults creamy yellow with abdominal segments marked with pale bands of purplish brown which may fade out along midline; female wingless; antenna 15-segmented (rarely fewer), with at least some segments annulated (ringed); female compound eye with 8 ommatidia (facets); hind femur with a lateral protuberance, tarsi usually 3-segmented; found primarily in domestic situations, common in stored grain and collections of biological specimens/material; distributed worldwide, occurs in midwestern and southeastern United States.

5. **Larger pale trogiid or deathwatch psocid:** *Trogium pulsatorium* (Linnaeus); Trogiidae.

Adults creamy yellow with reddish brown band through middle of head and another from compound eye to antennal base, abdomen with reddish brown spots mostly along front margin of segments; antenna with at least 21 segments; front wings represented as flat scales which reach base of abdomen; tarsi 3-segmented; found almost exclusively in homes, granaries, and mills; widespread in Europe and Japan southward to Australia, occurs primarily in the northeastern United States.

BIOLOGY

Most species are represented by both males and females while some are parthenogenetic (reproduction without males) in part or all of their geographic range. Most species which occur outdoors are fully winged whereas, those which are found indoors are typically wingless or with reduced wings.

The typical psocid life cycle involves an adult period of sexual inactivity, courtship and copulation (several times in males, often only once in females), oviposition, egg hatch, and 46 nymphal instars. Eggs are laid either bare or encrusted, and with or without webbing over them. Nymphs resemble adults in form except for wings but lack functional ocelli, never have more than 2-segmented tarsi, and early instars have fewer antennal segments than adults. Nymphs of adults with extreme wing reduction tend to have 4 nymphal instars whereas, those of fully-winged adults tend to have 6 instars.

Probably the 3 psocids most commonly encountered in homes are the banded psocid, cereal psocid, and larger pale trogiid. Since more is known biologically about the cereal psocid, it is summarized here. At 80 degrees F (27 degrees C) and 65% RH, preoviposition lasts 2- weeks, eggs are laid 1 every 12 hours until about 75% of total are laid and then only occasionally, 3 larval molts occur, and adults live over 3 months; developmental period (egg to adult) requires about 1 month. In southern Louisiana, from October to January, at 50-87-F (10-30 degrees C), preoviposition lasts 31-54 days (average 45 days), 7-44 eggs are laid (average of 20 eggs), eggs require 11-27 days (average 21 days) to hatch, the life cycle (egg to egg) ranges from 111-130 days, and the postoviposition period lasts 1-24 days (average 9 days). However from June to August at 60-95 degrees F (16-35 degrees C), eggs average 6.9 days to hatch, an average of 57 eggs are laid, and the average life cycle (egg to egg) is 24.4 days. Average time to egg hatch is 21 days, 24-65 days are required to reach sexual maturity, and 24-110 days are required for the life cycle (egg to egg). They can overwinter in the egg or nymphal stage. This species is primarily parthenogenetic although males are known.

For each species, there is a critical relative humidity below which they lose water to the environment and eventually die from desiccation. For many species this critical range varies from 50-60% RH. Dehydrated specimens become lethargic and have flattened and contracted abdomens. When returned to a RH above their critical point, they readily absorb moisture and become turgid, sometimes in as little as 2-3 hours.

HABITS

Psocids are typically found in **areas of high relative humidity** because they have trouble controlling water loss through their exoskeletons. High humidity conditions are also required for the growth of mold, the primary food of most psocids. When the humidity drops below a psocid species critical level, they migrate, sometimes in great numbers, to areas of higher RH or eventually die. Another reason their population may seem to go from zero to thousands in a few weeks is that because of their small size they are rarely noticed when their numbers are low. Also, adults usually die off in the winter but the eggs and/or small nymphs can survive the cold temperatures and can become adults in 3-4 weeks with the onset of warm weather.

In older homes, psocids are most commonly found in association with damp books whose starch sizing and glues readily support mold growth. Psocids are also found in other damp areas with mold growth such as bath traps with

leaking or sweating pipes, in wall, floor, and window and door casing voids, storage trunks, groceries, stored products such as flour, rugs, paper, straw matting, cardboard cartons, upholstered furniture containing Spanish moss as stuffing, in tow (flax, hemp, or jute fibers), and in closets, pianos, and cabinets.

In new homes, apartments, and office buildings, psocids are sometimes found within 412 months after construction before the plaster or sheetrock walls have dried out. This dampness associated with plastering temporarily supports mold growth, especially in wall voids.

In warehouses, groceries, and granaries/grain elevators, psocids are commonly found associated with damp spillage. In food, glass, pharmaceutical, bottling, canning, etc. production plants and many warehouse situations, they are commonly associated with improperly stored wooden pallets which have gotten damp and become infested with mold.

Other situations where psocids have been found include herbaria (plant collections), insect collections, libraries, and insect light trap (ILT) catch trays which have not been emptied on a timely basis. The senior author was involved with an infestation in a newly erected partition wall of a major art museum where plexiglass was used instead of sheetrock and the voids were filled with peanut hulls as decorative material.

Outdoors, psocids occur in bird and mammal nests, living foliage (agricultural products), dead foliage, ground litter, on top of tree bark, underneath loose tree bark, and on rock surfaces. They have also been found in mammal fur.

The larger pale trogiid or deathwatch psocid gets the later common name from the tapping sounds it produces by striking its abdomen against paper and similar materials. Other species may also produce such sounds.

The cereal psocid and larger pale trogiid are recorded as predators of the eggs of the Angoumois grain moth, *Sitotroga cerealella* (Olivier), and the banded psocid feeds on the eggs of the Indianmeal moth, *Plodia interpunctella* (Hubner).

MANAGEMENT

Psocid control is achieved by controlling the humidity. Lowering and keeping the humidity below 50% eventually kills psocids; a greater and/or quicker reduction of humidity reduces the time required. Additionally, products found

to be infested with psocids may be placed in reduced temperature controlled areas. The use of pesticides is of limited value. Check with your local pest management professional for advice.

Information obtained and compiled from the National Pest Management Association.

This publication contains general recommendations that are subject to change and update. For additional pest management information, please contact the Entomology Department at the Defense Supply Center Philadelphia-West Coast Support Office, Alameda, California. DSN 686-8122, commercial (510) 337-8122 or email paa5245@exmail.dscp.dla.mil

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